United States Environmental Protection Agency | Air and Radiation | EPA420-S-98-010 July 1998

Office of Mobile Sources

TRAQ Technical Overview

Transportation Air Quality Center

Transportation Control Measures: Improved Public Transit

EPA's main strategy for addressing the contributions of motor vehicles to our air quality problems has been to cut the tailpipe emissions for every mile a vehicle travels. Air quality can also be improved by changing the way motor vehicles are used—reducing total vehicle miles traveled at the critical times and places, and reducing the use of highly polluting operating modes. These alternative approaches, usually termed Transportation Control Measures (TCMs), have an important role as both mandatory and optional elements of state plans for attaining the air quality goals specified in the Clean Air Act. TCMs encompass a wide variety of goals and methods, from incentives for increasing vehicle occupancy to shifts in the timing of commuting trips. This document is one of a series that provides overviews of individual TCM types, discussing their advantages, disadvantages, and the issues involved in their implementation.

Improved Public Transit

Contents

Improved public transit is a transportation control measure (TCM) comprised of three main components, which may effectively reduce congestion and improve air quality. The goal of improving public transit is to provide incentives for single occupancy vehicle commuters to forgo driving for the convenient and reasonably priced alternative of mass transit. The three major ways of increasing ridership on public transit are (1) system/service expansion, (2) system/service operational improvements, and (3) inducements to travelers to increase ridership. Transportation planners should be aware that these strategies vary in risk, cost, and potential benefits.

1. Background

The three main components of improved public transit, and several different strategies which may be implemented for each of these broad categories, are discussed below.

➥ **System/service expansion** projects attempt to increase ridership by providing new rail system services and expanding bus services. Express bus services can be a particularly effective alternative to single occupancy driving because they can provide fast routes between suburban communities and downtown areas. In some cities, there are HOV lanes or bus lanes on main highways which enable people to save both time and money in their commute to work.

In the rail system category, the four major types of transit services are heavy rail rapid transit, light rail transit, commuter rail, and fully automated rail systems. The heavy rail system is characterized by high speeds (75-85 miles per hour) and high capacity (between 20,000 and 34,000 passengers per hour), and is most efficient when serving areas with greater than 50 million square feet of non-residential development. Light rail transit systems are designed for medium capacity (ranging from 2,000 to 20,000 passengers) and less developed urban areas. Commuter rail service is characterized by high-speed, station-to-station service, and is designed to transport people from suburbs to downtown areas. Full automated guideways are relatively new systems which circulate within urban areas and allow people easier access to congested facilities such as downtown areas or airports.

➥ **System/service operational improvements** focus on geographic coverage and scheduling changes which make mass transit a more attractive option. Research indicates that facilitating and/or eliminating transfers such as car/transit,

pedestrian/transit and bicycle/transit encourages more people to use public transportation. [1] Because reliability is important to many commuters, improving the maintenance of buses and rail services may result in increased ridership. Establishing a preventive maintenance program should not be overlooked when considering relatively inexpensive ways to attract more users of a transit system.

➥ **Inducements to potential transit users** include improvements in fare structures and policies, marketing programs, and passenger amenities. Although transit demand is relatively inelastic, some fare policies such as monthly or weekly passes and fare simplification (i.e., multiple operators accepting one fare medium) may encourage more ridership. Customer service and intense marketing of transit services may also increase the number of people using public transportation. One study indicates that a telephone information service sponsored by a transit operator increased ridership significantly. It was estimated that each call generated up to nine additional rides. [1] As for passenger amenities, the provision of such things as transit shelters, benches, maps, and visually pleasing aesthetics, or improving the comfort of buses and trains may be instrumental in increasing ridership.

2. Costs and Benefits

In Houston, San Diego, and Atlanta daily vehicle miles of travel on major freeways decreased 17.8 percent, 47.8 percent, and 55 percent respectively after mass transit improvements were made in the mid 1980s.

There are numerous examples of mass transit improvements that resulted in significant reductions in total vehicle miles (VMT) traveled annually. In Houston, San Diego, and Atlanta, daily vehicle miles of travel on major freeways decreased 17.8 percent, 47.8 percent, and 55 percent respectively after mass transit improvements were made in the mid 1980s. [1] In terms of air quality, the MetroLink program, an 18- mile light rail transit line that connects suburban communities with downtown St. Louis is estimated to reduce daily VMT and emissions considerably. Projections are 64,700 miles per day and 4,500 metric tons per year. [2] Air quality improvements are not difficult to estimate relative to other TCM's because the number of people utilizing the improved transit system is easy to quantify. The number of vehicles, miles traveled, and air emissions can then be estimated based on this information.

In addition to improving air quality and mitigating congestion, improving transit systems can provide other benefits. Lack of transportation to workplaces is a major impediment to efforts to move welfare recipients into jobs. Many poor people coming off welfare do not own a vehicle or have access to mass transit. Expanding transit services would provide this sector of the

population with a means to find employment and an affordable way to commute. The elderly are one of the fastest growing segments of the U.S. population and public transportation is critical to meeting their mobility needs when they can no longer drive.

Despite these benefits, there are several costs that need to be evaluated when considering improving public transit. Projects may be extremely costly if they are capital intensive (e.g., building rail lines) and rely on infrastructure changes; improvements involving transit schedules and public awareness programs are much cheaper. Examples of capital intensive projects are a dual rail/bus tunnel system in Seattle that will improve bus and rail service in the region, and a light rail line servicing Houston. These projects cost $400 million and one billion dollars, respectively. In Florida, the state department of transportation is largely funding a $36 million project to implement "bus only" lanes that will save thousands of people time and money on their commutes. [1] Improving bus shelters, instituting regional fare structures, and better signage are examples of effective improvements that cost much less than the capital intensive examples mentioned above.

3. Implementation

Making improvements in public transit may be a relatively risky strategy to relieve congestion and improve air quality because:

- Implementing changes to mass transit systems often requires substantial up-front investment of government resources.
- It may take a long period of time before infrastructure improvements are fully operational.
- Improved public transit may not increase ridership immediately, despite public awareness campaigns.

Improving transit systems is a complex process because of the extensive planning and coordination that is required. First, prior to extending rail or bus service, transportation departments need to secure adequate funding. This is often difficult because voter approval or permission from the state legislature is usually required. Second, to ensure the effectiveness of a public transit project, it is important to consider the land use patterns in the region. For example, transit services should be designed in conjunction with urban development plans to ensure that new development is served by transit. Additional considerations should be made to provide minimal walking distances to transit corridors and adequately controlled parking. In short, transit expansions should be part of a larger, more complex urban design project.

Once the improvements to public transit are made, aggressive marketing strategies should be enacted to encourage people to change their behavior. This may be the greatest barrier to

success, because people must realize the value of substituting mass transit for driving single occupancy vehicles. Public outreach materials and advertisements may be helpful in increasing voluntary ridership, but employer incentives are likely to be more effective.

The private sector plays an important role in increasing ridership in other ways as well. Developers may be encouraged to design housing and offices in a manner that allows people to conveniently use public transit. The private sector is also a valuable funding resource that may aid in offsetting some of the investment and operations costs if transit improvements result in employees using public transit and relying less on employer subsidized parking.

4. Equity Issues

Minorities, women and the elderly are disproportionately represented in the low-income sector of the population, and these groups of people therefore may pay an inequitable amount for transit services.

Implementing improvements to mass transit systems may benefit lower income groups more than highr-income groups because the cost savings resulting from owning fewer vehicles and maintaining them are proportionately greater for people of lower incomes. People with lower incomes tend to ride mass transit systems more than higher income individuals because they value money savings over time savings and convenience. Because higher income people tend to value time savings more, they choose to drive when it is quicker. If, however, taking a bus or rail line to work saves considerable time, high income people may use public transit more, and therefore, benefit as much as lower-income earners.

Improving pubic transit may also benefit minorities, women, and the elderly. A large number of minorities and women are projected to join the workforce, many of whom will benefit from a convenient alternative to driving that is less expensive than purchasing and maintaining a vehicle. Additionally, the number of elderly people is expected to grow considerably, and this sector of the population relies heavily on mass transit for their transportation needs, once they can no longer drive. It is worth noting, however, that much of the revenue used to enhance public transit systems derives from sales taxes which are regressive. [3] Minorities, women, and the elderly are disproportionately represented in the low-income sector of the population, and these groups of people, therefore, may pay an inequitable amount for transit services.

5. Summary of Recent Examples

Three examples of improvements to public transit will be used to illustrate the potential for reduced congestion, better air quality, and other benefits in light of the costs. The Bay Area Rapid Transit system, or BART was constructed in the mid-1970s to service three core counties in the region. It soon became apparent that the BART would need to be extended to include service for two other Bay area counties, San Francisco Airport, more downtown areas, and the

suburban neighborhoods of Santa Clara County. The funding for these improvements was derived from local (non-state) county sales taxes, old and new bridge tolls, Santa Clara County tax funds, the state, and the Federal government. Transit authorities hoped the improvements would continue to reduce the amount of auto travel in the region. In the mid- 1970's, auto travel decreased by an average of 7.6 percent, partly because 37 percent of BART riders previously drove alone. [1]

Another highly successful improvement in mass transit is the MetroLink which was constructed in 1993 in St. Louis, Missouri. This 18-mile light rail transit line connects the downtown area with residential, commercial, and entertainment centers along the Mississippi River. It is an electric-powered system which is quiet, efficient, and does not emit exhaust. The total cost of the light rail system was around $700 million, of which half was contributed by the federal government and half was paid by local counties. Weekday ridership averages 37,000 passengers and it is estimated to reduce VMT in the St. Louis region by as much as 139,100 miles per day. In terms of air quality, annual greenhouse gas emissions are reduced significantly as result of saving 7,130 gallons of fuel each day. In its first year of operation, MetroLink was estimated to have reduced carbon emissions by between 4,500 and 9,600 metric tons. [2]

6. Sources

[1] *Transportation Control measure Information Documents,* Cambridge Systematics, Inc., U.S. Environmental Protection Agency, Washington, D.C. (March 1992).

[2] *Reducing Greenhouse Gas Emissions Through the Transportation Partners Program: Recent Trends and Case Studies,* Apogee Research, Inc., Bethesda, MD (September 1995).

[3] *Opportunities to Improve Air Quality Through Transportation Pricing: An Information Document for Public Officials and Practitioners,* COMSIS Corporation (September 1995).

7. An On-Line Resource

The Environmental Protection Agency's Office of Mobile Sources has established the TCM Program Information Directory to provide commuters, the transportation industry, state and local governments, and the public with information about TCM programs that are now operating across the country. This document and additional information on other TCMs and TCM programs implemented nationwide can be found at:

http://www.epa.gov/omswww/transp/traqtcms.htm